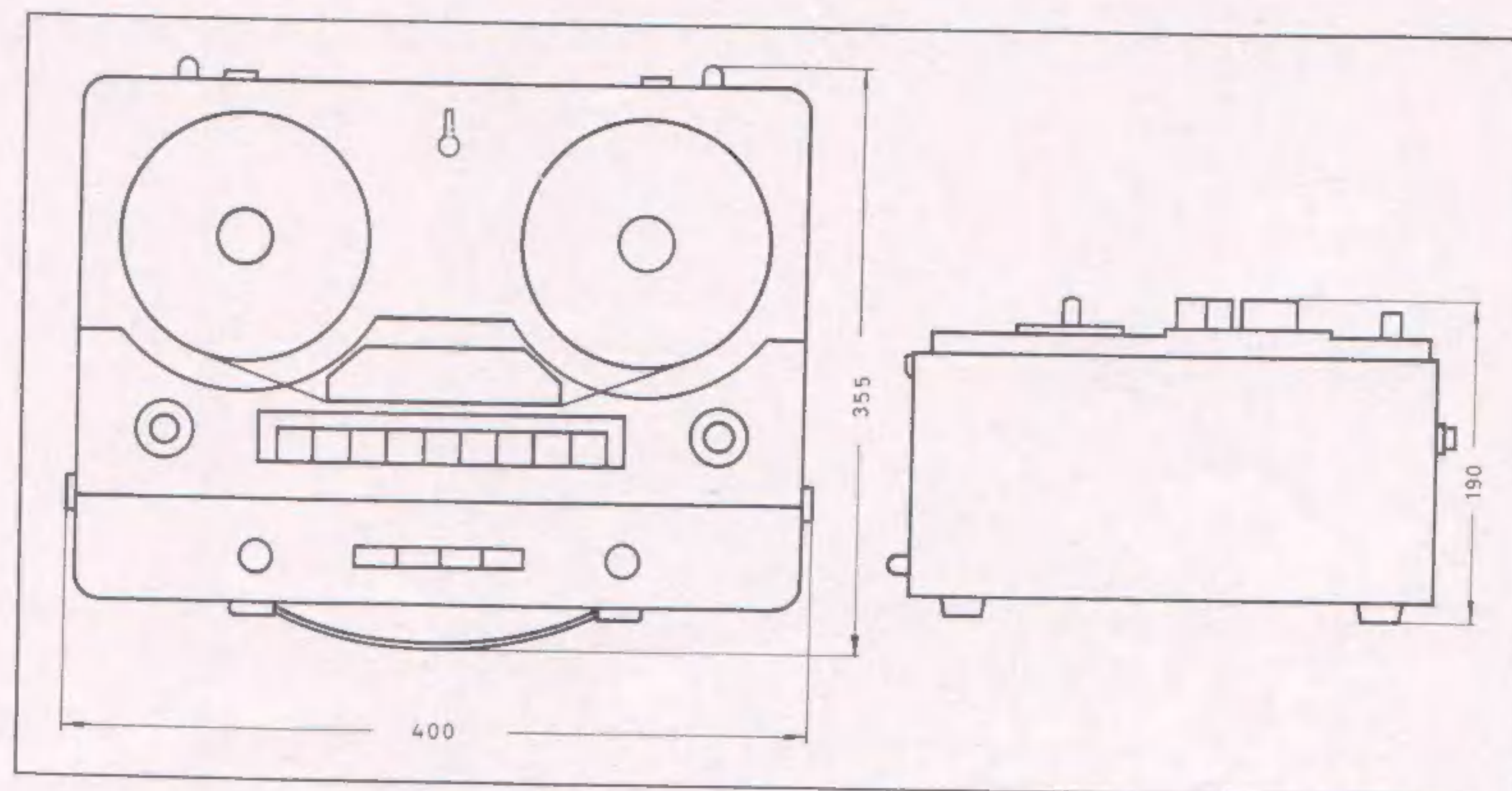
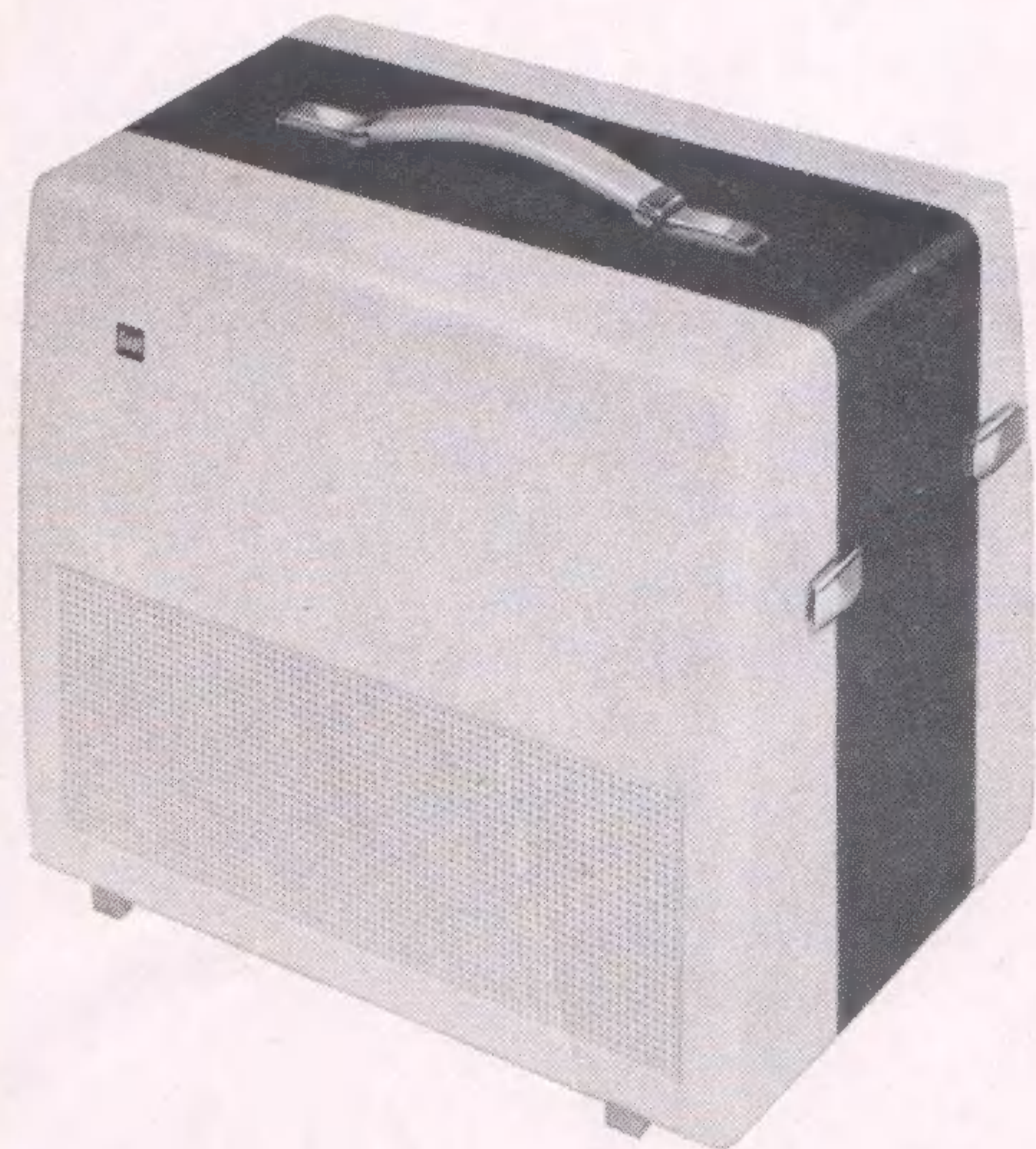


Instructions for Stereo Tape Recorder TG 12 A

Dual



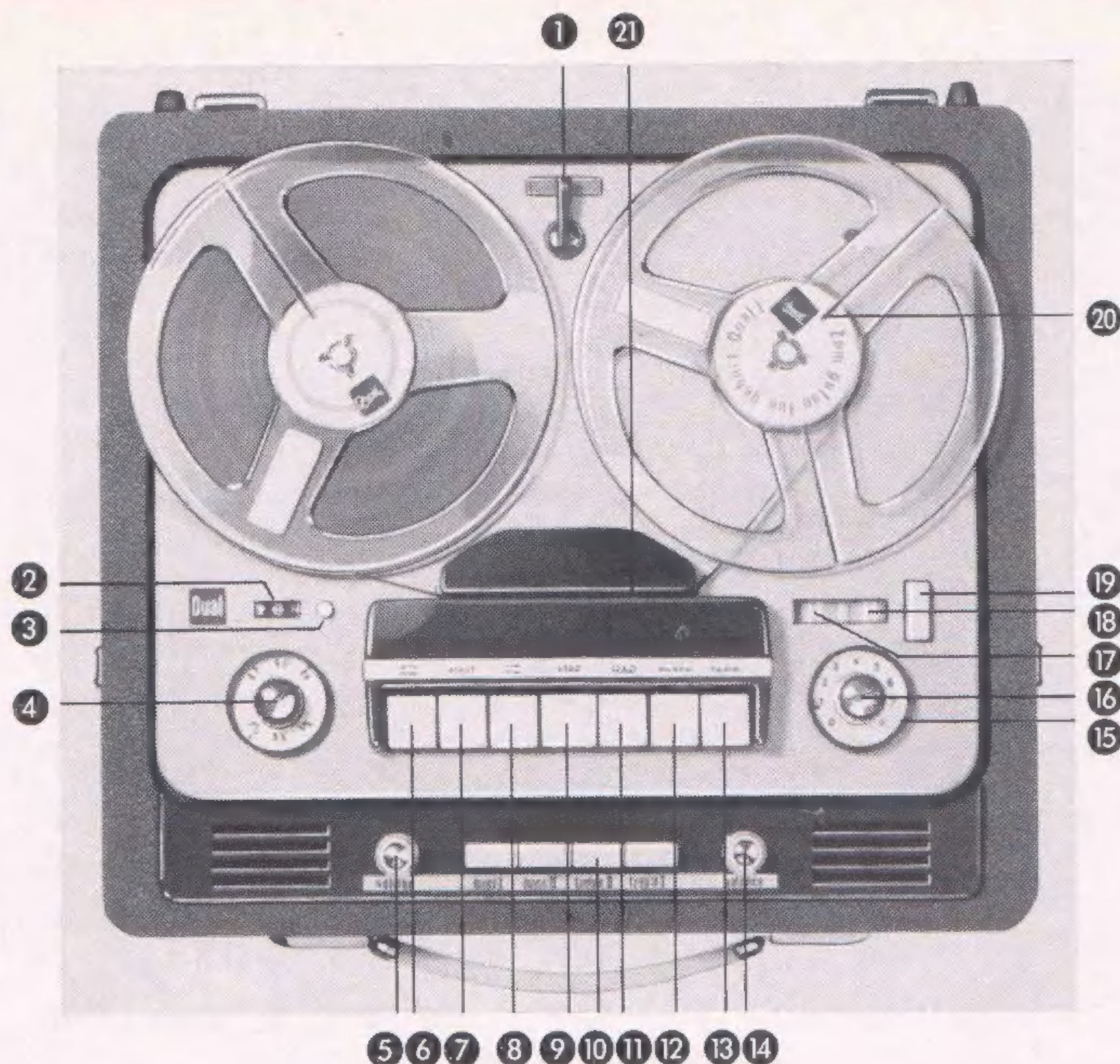
dualcan



The Dual TG 12 A 4-track Stereo Tape Recorder represents the ultimate in quality and versatility. It offers a wide variety of recording techniques, detachable speaker units for utmost flexibility in stereo playback and 7" reel capacity . . . all in a compact, portable unit.

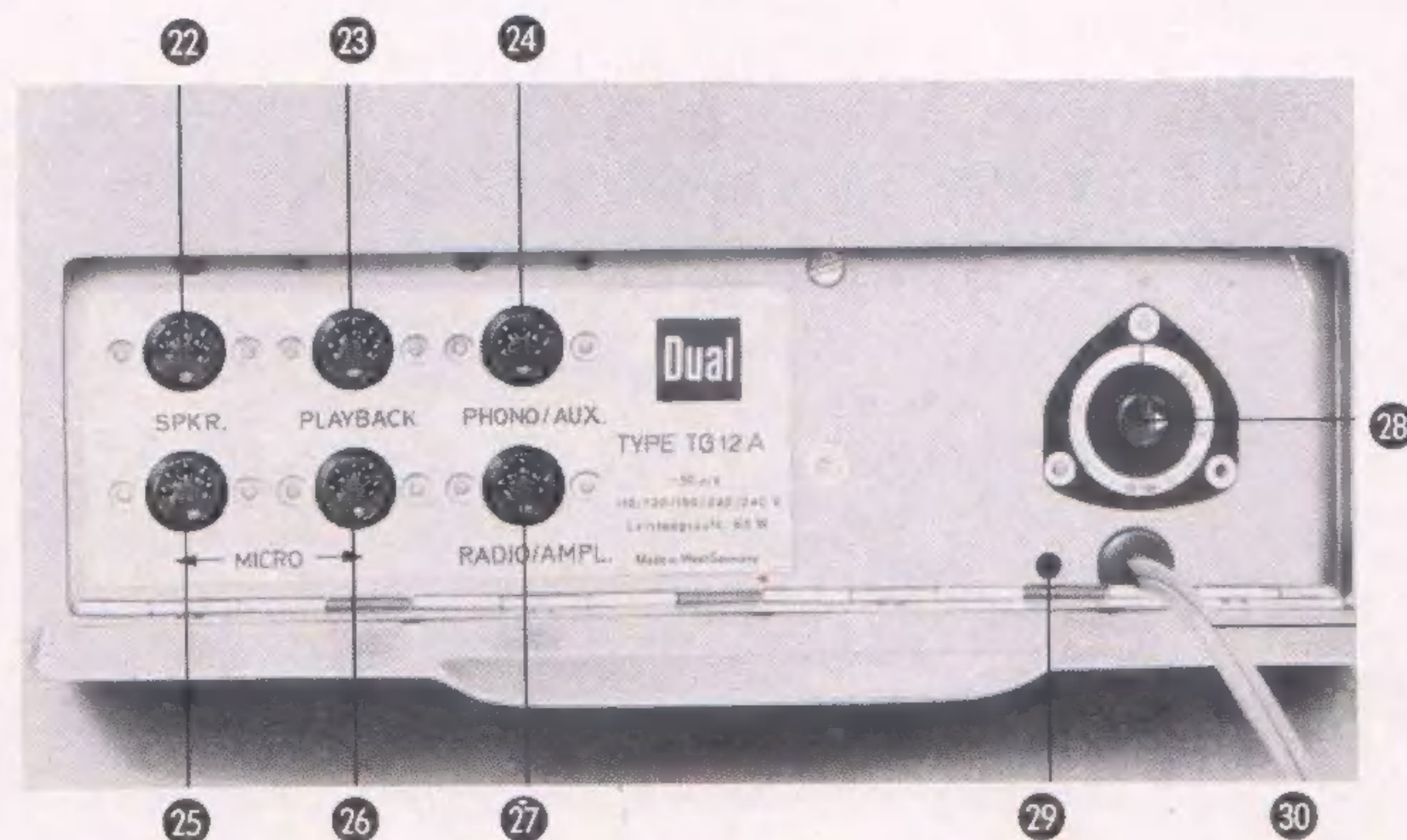
When closed, the TG 12 A should always be placed in the vertical position, with the handle up.

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Dual TG 12 A Operating Controls

- 1 Track selector switch
- 2 Tape counter
- 3 Tape counter zero setting
- 4 Tape speed selector
- 5 Playback level control
- 6 Rewind
- 7 Start
- 8 Fast forward
- 9 Stop
- 10 Tone control buttons
- 11 Playback
- 12 Microphone record
- 13 Radio record
- 14 Balance control
- 15 Record level control (right channel)
- 16 On-off switch and record level control (left channel)
- 17 Recording level indicator (left channel)
- 18 Recording level indicator (right channel)
- 19 Multi-playback button
- 20 Threading slot in take-up reel
- 21 Tape groove



Terminal Board (at the rear of the unit)

- 22 Output for speaker / earphones
- 23 Monitor output
- 24 Auxiliary phono input for sound-on-sound recording
- 25 Microphone input — right channel
- 26 Microphone input — left channel and stereo
- 27 Radio input for record, playback and stereo play
- 28 Voltage selector and fuse
- 29 Ground connection
- 30 Power cord

Technical specifications

Current	AC 50 cycles, adaptable to 60 cycles		
Line voltage	110, 117, 150, 220, 240 V		
Power consumption	Approx. 65 W		
Fuses	110—150 V — 0.8 A; 220—240 V — 0.4 A		
Number of tracks	4, international standard		
Tape speeds, ips	1 ⁷ / ₈	3 ³ / ₄	7 ¹ / ₂
Frequency response	40-9000 cps	40-16.000 cps	40-20.000 cps
Signal / noise ratio	≥ 49 db	≥ 50 db	≥ 52 db
Distortion	≤ 5 %	≤ 5 %	≤ 5 %
Wow & flutter	≤ 0.3 %	≤ ± 0.25 %	≤ 0.15 %
Crosstalk	40 db		
Tube complement	2 × EF 86, 2 × ECC 81, 1 × ECC 83, 3 × EL 95, 2 × EAM 86, 1 selenium rectifier		
Inputs	Microphone: 2 mV / 10 Mohms Radio: 2 mV / 22 Kohms Phono: 100 mV / 1 Mohms "Radio": approx. 1.5 V / 18 Kohms		
Output	2.5 watts per channel		
Power output	Approx. 5 ohms		
Auxiliary speaker	By speaker or earphone		
Monitoring	Approx. 1.2 ohms		
Internal impedance of output stage	By 4 push-buttons (both channels)		
Tone control	Record: by separate controls		
Balance control	Playback: by control between two output stages		
Equalization	At 1 ⁷ / ₈ and 3 ³ / ₄ ips: 1600 / 100 μs At 7 ¹ / ₂ ips: 1600 / 50 μs Max. 7"		
Reel capacity	By mechanical switch at end of tape		
Automatic tape stop	340 mm high, 390 mm wide, 270 mm deep		
Dimensions (over-all)	31 lbs., 14 ¹ / ₂ oz. (14,5 kg)		
Weight			

Dear tape enthusiast:

Congratulations on having selected the Dual TG 12 A Tape Recorder. You are now the owner of a complete stereo instrument of superb quality and unusual versatility.

This recorder embodies the very latest advances in the technology of magnetic tape recording. Its motor drive — of straight-forward, uncomplicated design — is powerful, dependable and gentle to the tape. Operating controls are conveniently arranged, easy to master and virtually eliminate any possibility of error on your part.

The specially designed stereo amplifier serves as the audio center for a variety of applications. For example, you can listen to, as well as record from, all standard mono and stereo sound sources. In addition, you can make both sound-with-sound and sound-on-sound recordings without need for additional equipment. For optimum results, monitoring of all recording and playback functions can be done through the built-in speakers or earphones, and checked visually as well. The built-in stereo output also permits monitoring of the signal at the instant it is recorded.

With its 4-track system and choice of three tape speeds, the TG 12 A allows you to get the maximum recording time out of every reel of tape, thus reducing your cost of operation. With a single 7" reel, for example, holding 1800 feet of tape, the $1\frac{7}{8}$ ips speed gives you six full hours of recording time in stereo, twelve in mono !

Each channel is reproduced through its own detachable speaker... unusually large for a portable unit. The Dual speakers can be used either standing or suspended, and at varying distances from each other to provide proper stereo separation in rooms of different sizes and shapes.

Now, to assure the maximum enjoyment from this fine tape recorder, we suggest you read this manual carefully and follow the instructions as given.

Connecting the Recorder and preparing for Operation

1. Setting up the recorder

With the recorder in its vertical position, remove the bottom cover, then place the recorder in its horizontal position and remove the upper cover. Do not operate it on a very soft surface, such as a carpet or thick tablecloth, as this will interfere with the cooling circulation of air underneath.

2. Power supply

Use only with 50 cycle AC. (Use with 60 cycle AC only when adapted by a serviceman.) Power requirements are set at 220 volts. For other voltages, the selector ②⑧ must be set accordingly. With 110, 127 and 150 volts, the fuse ②⑧ must be replaced by the 0.8 A fuse supplied with the recorder. To change the fuse, press down on the knob and turn to the right until the pointer is aligned with the slit and the switch knob or fuse holder becomes accessible.

3. Speaker connections

The left speaker (with Dual insignia) plugs into the SPKR output ②② on the back of the recorder. The right speaker plugs into the input on the back of the left speaker.

4. Microphone connections

For recording in mono, plug the microphone into MICRO LEFT ②⑥. For stereo, the second microphone plugs into MICRO RIGHT ②⑤. Each microphone should be placed on the corresponding side of the sound source. A test recording should be made to determine the best position for the microphones in each case.

Special stereo microphones plug into MICRO LEFT. The microphone inputs are designed for the high impedance microphones used widely today for superior recordings. If microphone extension cables are needed, use only those shown on page 15.

5. Radio connection

Radio broadcasts can be recorded by use of patch cord 61 A - U 50 connected between the RADIO input of the Dual and the proper output of the radio (or tuner). If the radio has a 3-prong output, a special adapter, VS 35, is required for use with the 5-prong patch cord supplied. Older radios without outputs for this purpose can be modified by a serviceman. Tapes can also be played back through radios with appropriate inputs.

6. Record player and tape recorder connection

To record from either a record player or another tape recorder, simply connect the output of either source instrument to PHONO ②④. In re-recording from tape, connect patch cord 61 A - U 50 to the RADIO output of the recorder being used as the program source.

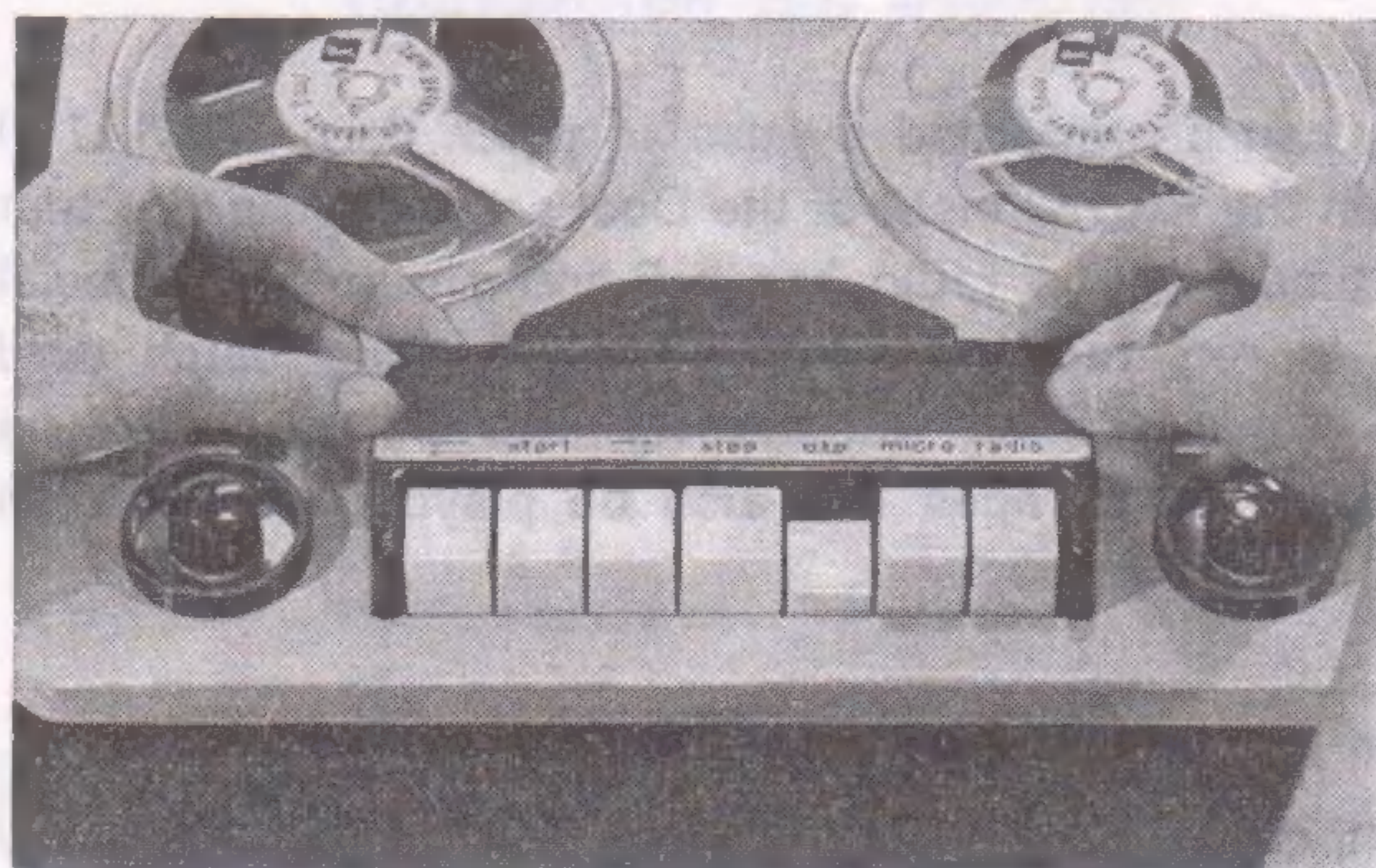
7. Loading the tape

The Dual TG 12 A handles all varieties of tape. For best results, however, use tapes recommended for 4-track recording. Reels up to 7" diameter can be used. Take-up and feed reels should be the same size.

Place the full reel on the left spindle, the empty take-up reel on the right. Now guide the tape — without twisting — through the tape groove ②① into the threading slot ②② and, holding it tight, wind it one turn around the hub of the take-up reel. Be sure to follow the illustration. While threading the tape, do not press **Fast Forward** ⑧, **Fast Rewind** ⑥ or **Start** ⑦.

If the tape is to be cut at any particular point, first push **STOP** ⑨. Then, using both index fingers, pull the tape toward the front of the recorder and then upward to lift it out as shown in the illustration on page 6. (Detailed instructions on editing and splicing are on page 12).





8. Tape speed setting

By turning the Tapespeed Switch ④, you can select any of the 3 speeds: $1\frac{7}{8}$, $3\frac{3}{4}$ or $7\frac{1}{2}$ inches per second. The higher the speed used in making a recording, the better the tone quality. Speeds are given in inches cm's above and below the switch, respectively.

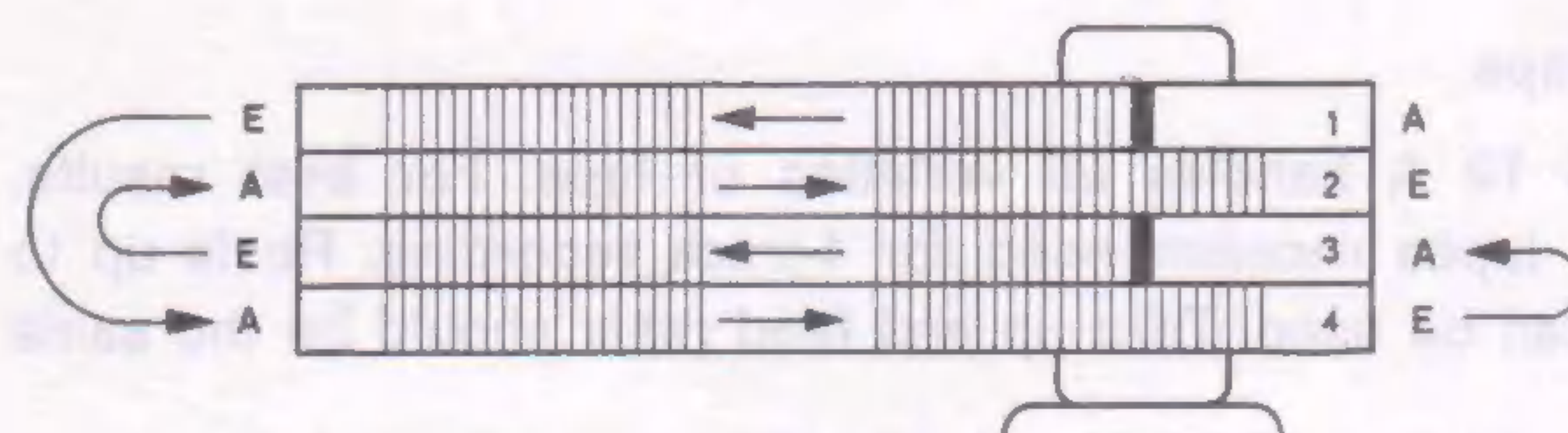
9. Tape counter

The Tape Counter ② serves to locate any specific point on the tape. It's a good idea to set the counter to 000 with the push-button ③ when loading the tape.

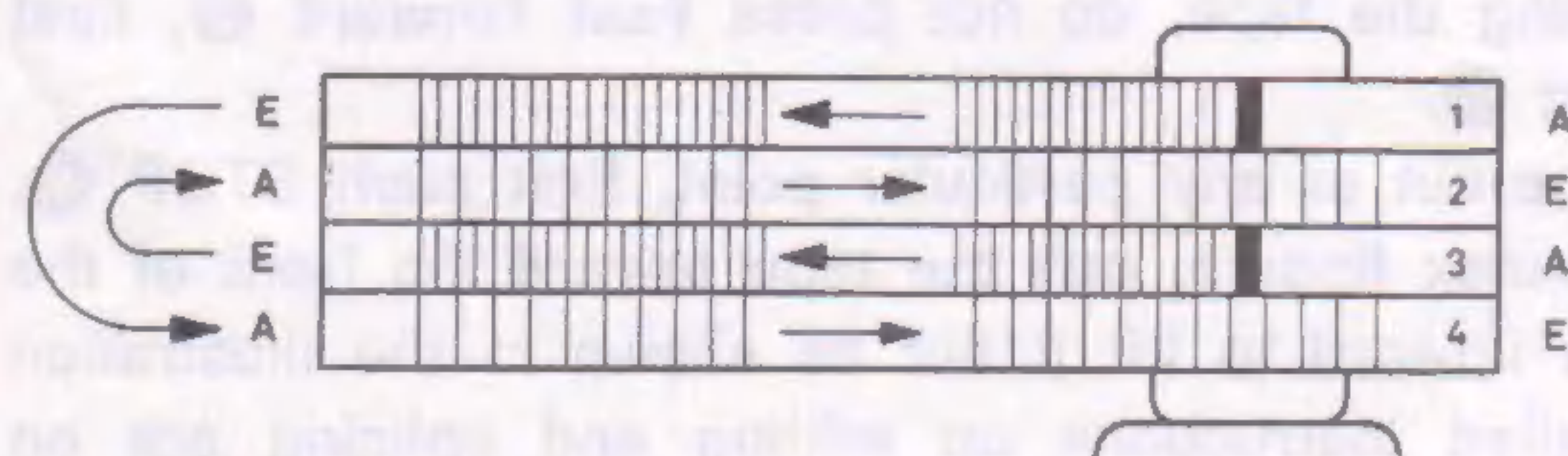
10. Track selector switch

The Dual TG 12 A can record either 2 x 2 stereo or 4 x 1 track mono on one tape. For stereo recordings set the Track Selector Switch ① to the 00 setting. With the Switch set on 1—4 and 3—2, respectively, you can make four consecutive 1-track mono recordings. Thus a single reel can be run through twice for stereo, four times for mono.

To record in 4-track mono: Set selector on 1—4 and record entire tape (track 1); reverse reels and record tape again (track 4); reset selector to 3—2, reverse reels and record for the third time (track 3); reverse reels and record once more (track 2). Mark the tape reel box accordingly.



4-track mono recording



stereo tracks

11. Monitoring the recording

With the Dual TG 12 A in the recording mode, the recording may be monitored by means of the built-in preamp output stage and Dual speakers. However, when recording with a microphone, we suggest using monitoring earphones plugged into "SPKR" ②② to avoid acoustic feedback.

12. Sound-with-Sound recording

This is accomplished by recording 2 successive mono tracks (Selector Track Switch ① in position 1—4 for the first recording and then at 3—2). For simultaneous playback, set the selector switch to position 00. For perfect synchronization of both recordings, the first must be

monitored while recording the second. Insert the earphone into **Playback 23** and push Multi-Playback Button. Use the inner recording level knob **16** to control the new recording and the outer knob **15** for the playback level of the first recording as heard through the earphone. Note: The Multi-Playback Button **19** pops up automatically when **Stop 9** is pushed down.

13. Sound-on-Sound recording

In sound-on-sound recording, the existing recording on track 1 can be intermixed with a new recording on track 3. With both recordings now mixed on track 3, track 1 can be erased and the track used for another new recording to which the previously mixed recording is then added. The TG 12 A can do this repeatedly with no loss in quality. Make sure the Track Selector Switch **1** always shows the number of the track being recorded.

You can monitor the new recording through the speakers, although with microphone recordings, it is preferable to use earphones plugged into "SPKR" **22**. The level of the first recording — to which a second is to be added — is now controlled with the outer knob **15**, the level of the added signal controlled with the inner knob **16** and also by the Magic Eye of the recording level indicator **17**.


Operating the Recorder

14. Before operating the recorder, check the voltage selector on the back to see that it matches the available current. (See paragraph 2).


15. Turning on the recorder

The on-off switch is **16**. A few seconds after it is turned on, ready-lights **17** and **18** will indicate when recorder is ready for operation.

16. Fast rewind

Push button "  " ⑥.

17. Fast forward

Push button "  " ⑧.

18. Starting the tape

Push START ⑦ to set the tape in motion at the selected speed.

19. Stopping the tape

Push STOP ⑨ to stop the tape movement without cancelling the previous mode of operation. This button may also be used as an "instant stop" during recording (e. g., for insertion of a commercial).

20. Recording

To prepare for recording, push STOP ⑨ and at the same time, either MICRO ⑫ or RADIO ⑬. Adjust the level with the Record Level Control ⑮ or ⑯ until the light bands of the Recording Level Indicators ⑰ and ⑱ almost touch each other at the loudest part of the recording. Actual recording begins and ends when START ⑦ and STOP ⑨, respectively, are pushed.

The recording can be monitored through the built-in speakers. However, when recording by microphone, it is preferable to monitor through earphones so as to eliminate acoustic feedback. Playback Level Control ⑤ and the Tone Control Buttons ⑩ have no effect on the signal being recorded.

a) Microphone recording

Push MICRO ⑫.

Volume is adjusted by turning Playback Level Control ⑤. The desired tone for both channels can be selected by the Tone Control Buttons ⑩. Various tonal effects can be produced by pushing a combination of these buttons.

b) Playback through radio or amplifier

The radio (or amplifier) is first switched to tape (phono) reproduction. Level and tone are also controlled with the radio (or amplifier), since the output stages of the Dual are not needed in this case. (See paragraphs 5 and 6).

The high output of the TG 12 A — about 1.5 V / 18 K — permits the use of external amplifiers with output stages of even very low sensitivity. However, when using external amplifiers requiring low level inputs, the first amplifying stage may be exceeded and cause distortion. In this latter case, consult your audio dealer.

c) Larger speaker systems can be connected to SPKR ②② using the Dual's output stages. The impedance of the auxiliary speaker should not be less than 2 ohms. Observe polarity to avoid mismatch.

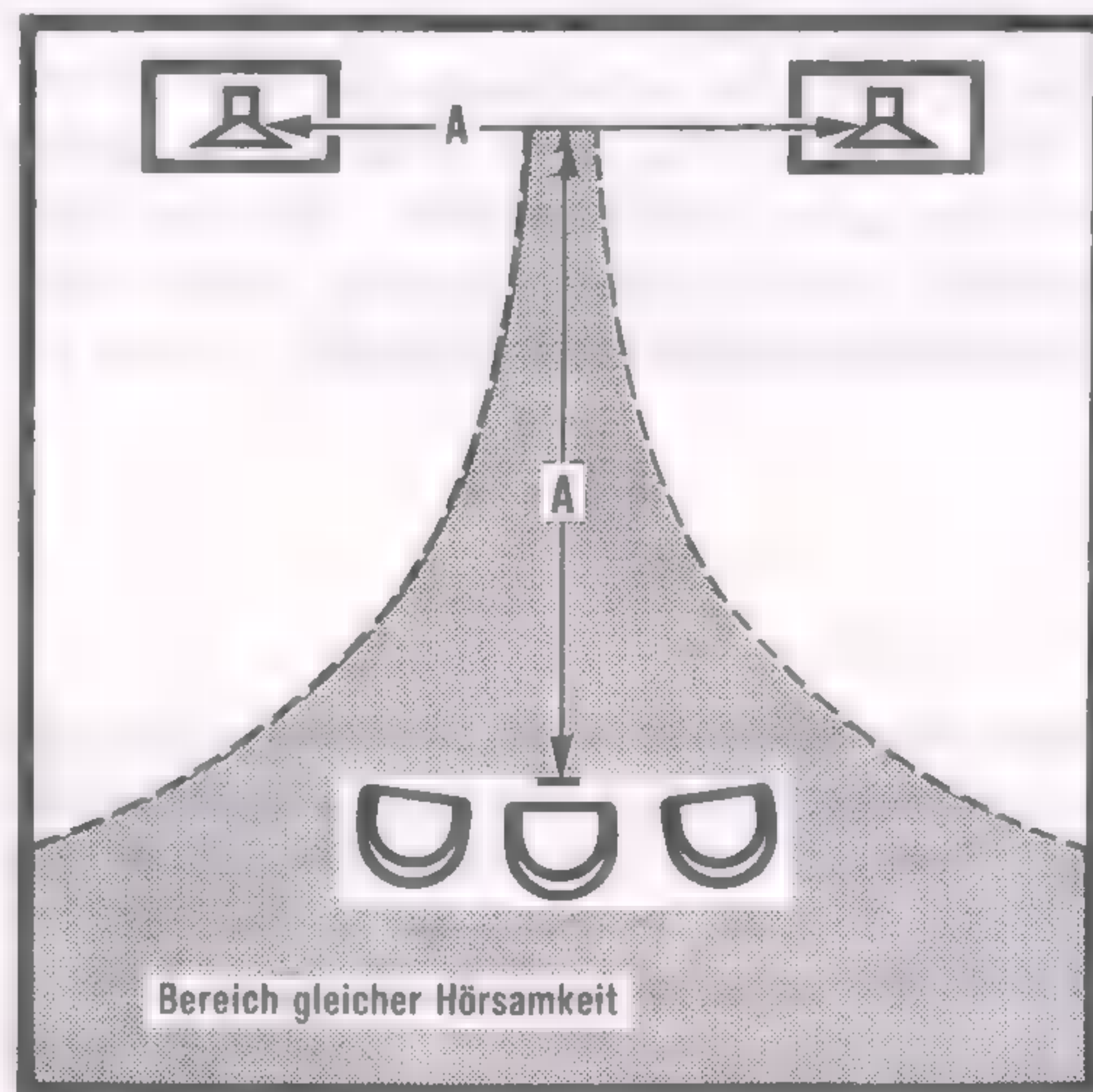
22. Erasing the tape

With each new recording, any previous signal on the affected track is erased automatically. To erase any track without re-recording, turn the Level Controls ⑮ and ⑯ down completely while running the tape in the record mode. (A faster method to erase a complete tape is to use a bulk erase, available at your audio dealer.)

23. Using the TG 12 A with a record player

The Dual can also be used as an amplifier and speaker for listening to stereo and mono phonograph records. The method of operation is the same as in recording from records (see paragraph 6). Here also, the Recording Level Indicators ⑰ and ⑱ will indicate maximum listening levels without distortion.

Placement of Speakers



In stereo reproduction at home, there are locations with more or less favorable acoustics, just as in the original concert hall. The best stereo effect is obtained at a point that forms an equilateral triangle with the line between the two speakers. Depending on the distance between the speakers, the listening room will offer a stereo listening area as indicated by the shaded portion of the adjoining illustration. Within this area, the stereo effect corresponds to the orchestra seating in the concert hall. The speakers, therefore, should be arranged in the room so as to provide the largest listening area for optimum stereo.

When placing the speakers, utilize as much of the room as possible without creating a "hole in the middle". Naturally, in a relatively small room, the best listening area will be correspondingly closer to the speakers. In each case, try to maintain the relationship of the distance from listener to the line between the speakers equalling the distance between the speakers.

24. Recording telephone conversations

By connecting the telephone adapter to MICRO 25 or 26, both incoming and outgoing telephone calls can be recorded.

25. Adding sound to film

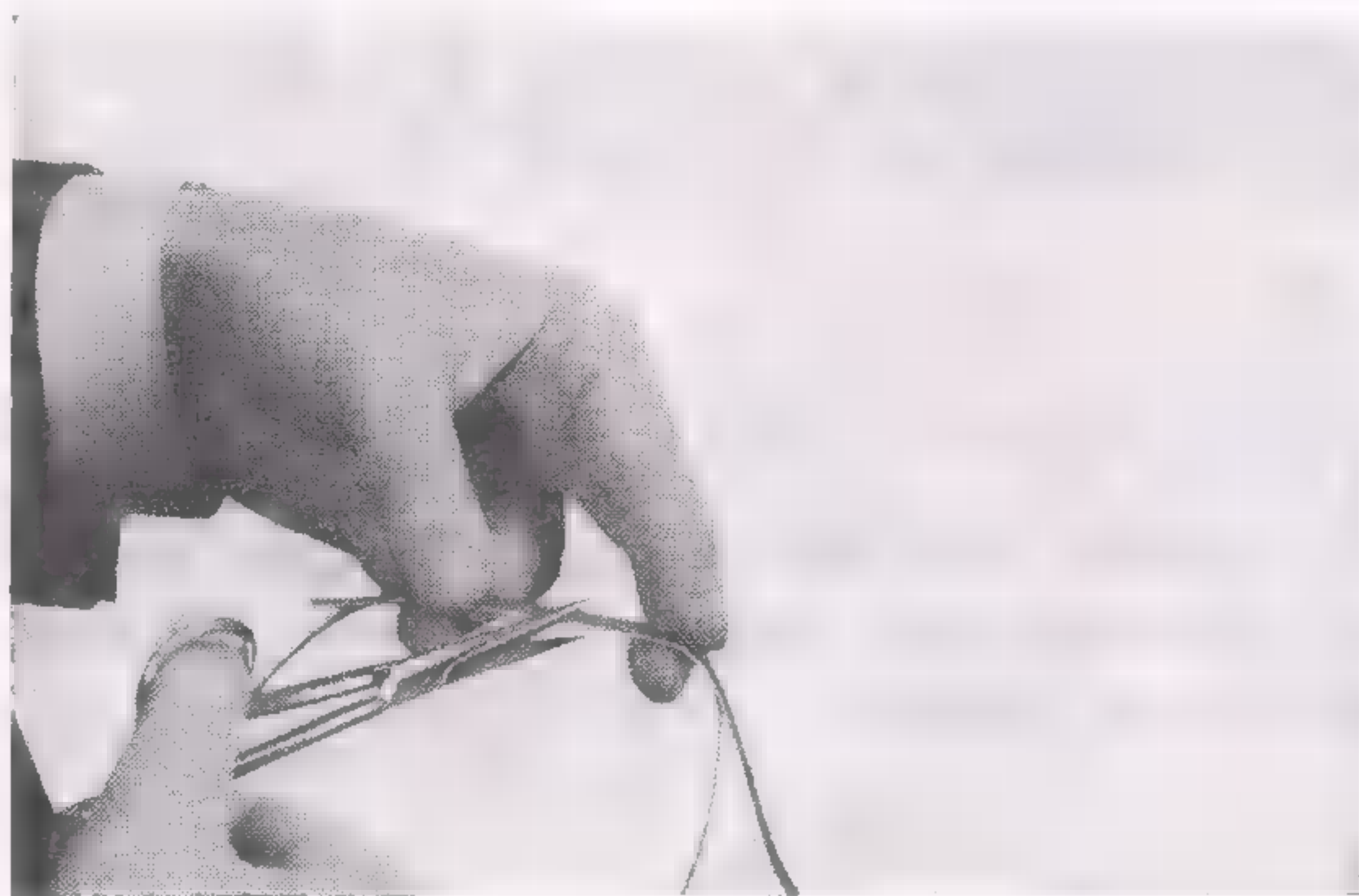
Commercially available accessories make it possible to add sound to home movies and slide film programs. Instructions for these techniques are generally provided with the required accessories. (Photographic magazines frequently carry articles on synchronizing background music and narration to films.)

A few recording tips

Keep the distance between sound source and microphone constant to prevent undesirable volume fluctuations. If you are not using a microphone stand, place the microphone on a soft surface to minimize vibrations.

When recording stereo, make a few preliminary test recordings to determine the best placement of the microphones. Make sure that the original sound is not completely separated into right and left channel recordings by the separate microphones. Instead, try to achieve ■ balanced response over the entire breadth of the event being recorded.

Both recording indicators should show the same level for the test recording, with the level of each adjusted for any imbalance caused by the room's characteristics or the microphone locations. If you notice too much resonance, try moving the microphone closer to the speaker (not less than 6", however) or wrap the microphone in a few folds of soft cloth. With the proper recording level determined, note the setting of the control and turn it back to zero before beginning the actual recording. Push START and then re-set the level as desired so that the noise of the starting action will not be recorded. Follow the same procedure when recording from records to avoid picking up noises from the lead-in grooves. When taping from records, first locate the loudest portion to be recorded and set the level accordingly.



Editing and splicing tape

For consistency in performance characteristics, it is advisable to use the same kind of recording tape. Otherwise, differences in level may be audible when the tapes are spliced. Splicing tape is ■ simple operation, yet requires ■ certain amount of care in order to make the splice inaudible when being played. The ends of two tapes to be spliced should first be carefully overlapped with the coated (dull) side facing down, then cut at a diagonal with ■ razor blade or a non-magnetic scissors.

Then apply a short (approx. 1") strip of splicing tape. The edges of the splicing tape should not extend beyond the edge of the magnetic tape, as this would cause the tape to adhere to the next surface on the reel and also to pick up dust. If you notice such an overlap, trim it off carefully.

To locate an exact location on the tape at which to cut, remove the cover plate to make the tape more easily accessible. Then play the tape until the section you want passes the playback head and press STOP ⑨. By rotating the tape reels back and forth by hand, you can be absolutely certain, as you can still hear the signal. Lift the tape and mark it on the glossy side with a grease pencil where it is opposite the playback head. Repeat this procedure to find the end of the section of tape to be eliminated. Then overlap the two marks, cut and make the splice as described above.

Splicing can be done without special equipment, but a splicing block with its special groove to hold the tape will make the task much easier.

Care and maintenance

The Dual TG 12 A Tape Recorder is a precision instrument that has been carefully engineered to eliminate any need for maintenance of its mechanical parts. Any adjustments made by anyone not a qualified serviceman will probably result in more damage than improvement. Lubrication is required only at long intervals and should also be left to a serviceman.

Care of tape and tape transport

Today's extremely thin tapes require that the mechanical functions of a recorder (start, stop fast forward and rewind) place no undue stresses on the tape. You may use even the thinnest of these tapes with complete confidence in the gentle handling they will receive by the Dual.

Thin tape is very pliable and makes good contact with the recording head, essential for optimum reproduction of the higher frequencies. The slower the tape speed and the smaller the gap of the recording head, the more important this contact between tape and tapehead becomes. Even tiny dust particles or imperfections on the coated surface of the tape cause it to separate from the head at the gap. Both recording and reproduction will then be adversely affected by fluctuations in output level and falling off of the highs. Therefore, you should use only first quality tapes with even edges — and warp-free reels.

Tapes that are frequently used should be cleaned occasionally with a lint-free cloth (during fast forward or rewind). The capstan, tapeheads and every surface contacting the tape should be cleaned regularly (usually after twenty hours of playing time). Either use a clean cloth dampened with alcohol, or one of the special cleaning formulas available at your audio dealer. These parts are readily accessible after lifting off the cover plate.

A cotton-tipped swab stick will help remove any badly sticking particles. Never use metal instruments. Moreover, magnetize tools (e. g., screwdrivers) must not come into contact with any part of the tape drive mechanism, recording head, or tape itself. Should you detect hum in the speaker when playing an erased tape, demagnetize the parts shown in the adjoining illustration. (Use Dual De-Magnetizer KDW 203.) Remove the tape from the recorder before demagnetizing.

Modern tapes do not lose their magnetic properties even under conditions of severe heat and cold. However, it is best not to place recorded tapes in bright sunlight. Tapes should be stored in the reel cans made for this purpose and kept in these cans whenever not being used. This simple effort is little enough to preserve the results of your recordings.



Accessories for TG 12 A

The two microphones in the foreground are monophonic types. One for each channel is required for recording in stereo.

Dynamic Directional Microphone MD 407 HN

Cardioid type: high and low impedance.
Frequency response to 12 kc
B.-No. 54 A - U 3

Dynamic Microphone MD 601 HN

Omni-directional type: high or low impedance.
Frequency response to 10 kc
B.-No. 54 A - U 4

Dynamic Stereo Microphone MDS 1

For both stereo and mono recordings. Connection to TG 12 A requires conductor cable TM 514 HN.
B.-No. 54 A - U 2

Microphone Floor Stand ST 201

Telescopic extension column.
B.-No. 54 A - U 51

Patch Cord

For connection to radio and / or second tape recorder.
B.-No. 61 A - U 50

Connection Coupling VS 35

For connecting patch cord (B.-No. 61 A - U 50) to radios with 3-prong contact.
B.-No. 4019 / 11

Telephone Adapter

For recording both incoming and outgoing telephone conversations.
B.-No. 54 A - U 152

Cable with 5 m Extension Cord

For selective connection with high and low impedance microphones.
Transmission ratio 1 : 16.
B.-No. 54 A - U 82

Microphone Extension Cable (5 m)

For additional extension when used with cable
B.-No. 54 A - U 71.
B.-No. 54 A - U 72

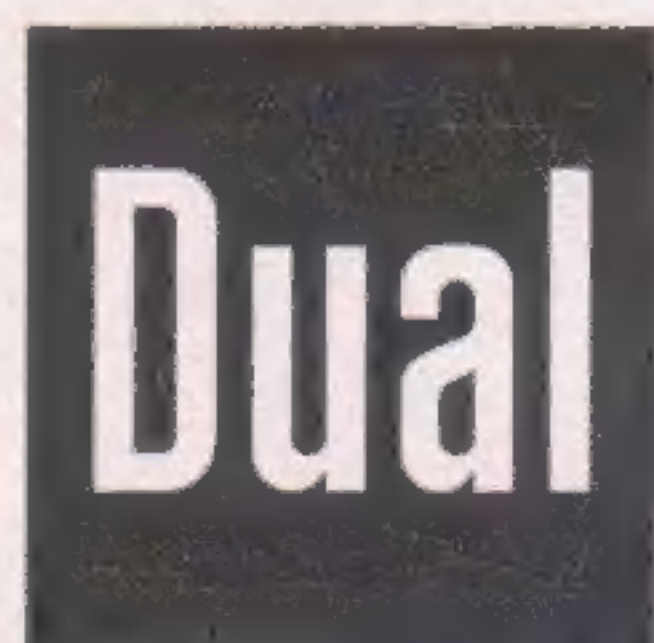
Stereo Earphones HZS 14 H

High impedance. B.-No. 54 A - U 157

Mono Earphones HZS 13

High impedance. B.-No. 54 A - U 156.
For monitoring signal during recording.

Additional accessories upon request.



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